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The Role Of Physical Therapists And Nurses In The Non-Pharmacological Management Of Pain And Functional Mobility In Older Adults With Chronic Low Back Pain A Systematic Review Of Randomized Controlled Trials

Rasha Hassan Ali Alsawad[1],Mohammed Ali Alhajji Mohammed[2],Zainab Hussain Radi Al Banai[3] ,Fatimah Ibrahim Alyousef[4],Sajeedh Sadiq Mohammed Alsmail[5],Zainab Ahmed A Aziz[6],Afnan Hassan Abdullah Al-Samen[7],Afaf Ali Abdullah AlQassab[8],Eman Abdulaziz Alsaif[9],Alyah Sadiq Alsmail[10]

[1]Home health care, Dammam Medical Complex
[2]Nurse (Home Health Care), Damam Medical Complex
[3]Technician-Physiotherapy (Home Health Care), Damam Medical Complex
[4]Nurse (Home Health Care), Damam Medical Complex
[5]Technician-Physiotherapy (Home Health Care), Damam Medical Complex
[6]Technician-Physiotherapy, Home Healthcare at Safwa General Hospital
[7]Technician-Physiotherapy (Home Health Care), Damam Medical Complex
[8] Physiotherapist, Safwa General Hospital
[9]Physiotherapy Technician, Home Health Care, Dammam Medical Tower
[10] T. Pharmacy, Dammam Medical Tower

Abstract

Background: Chronic low back pain (CLBP) is a prevalent condition among older adults, leading to functional limitations, reduced quality of life, and increased healthcare utilization. While pharmacological interventions are commonly used, they often carry risks of adverse effects, particularly in the elderly population. Non-pharmacological strategies, including exercise, physiotherapy, education, and nursing-led interventions, are increasingly recognized as safe and effective approaches to manage pain and improve functional mobility. **Objective:** This systematic review aims to evaluate the effectiveness of physical therapist- and nurse-led non-pharmacological interventions in reducing pain and enhancing functional mobility in older adults with chronic low back pain, based on evidence from randomized controlled trials (RCTs). **Methods:** A systematic search was conducted in electronic databases including PubMed, Scopus, Cochrane Library, and CINAHL from inception to 2025. RCTs evaluating non-pharmacological interventions delivered by physical therapists or nurses for adults aged 60 years and older with CLBP were included. Studies were screened for eligibility, and data were extracted on intervention type, duration, outcomes related to pain intensity, functional mobility, and adverse events. Quality assessment was performed using the Cochrane Risk of Bias tool. **Results:** Twenty-two RCTs involving a total of 1,845 older adults met the inclusion criteria. Interventions included structured exercise programs, mobility training, cognitive-behavioral therapy, education on pain management, and nurse-led home exercise support. Across studies, physical therapist-led exercise interventions consistently reduced pain intensity, improved functional mobility, balance, and muscle strength, and enhanced overall quality of life. Nurse-led interventions focusing on patient education, adherence support, and home-based activity promotion demonstrated significant improvements in functional outcomes and patient engagement. Combined physical therapy and nursing interventions showed synergistic effects, with greater reductions in pain and improved functional performance compared to single interventions. Adverse events were minimal, confirming the safety of these non-pharmacological strategies for older adults. **Conclusion:** Non-pharmacological interventions delivered by physical therapists and nurses are effective and safe strategies for managing pain and enhancing functional mobility in older adults with chronic low back pain. Integrating these approaches into routine care can reduce reliance on pharmacological treatments, improve patient outcomes, and support

independent functioning. Future research should investigate long-term effects, cost-effectiveness, and strategies for broader implementation in diverse healthcare settings.

Keywords: Chronic low back pain, older adults, non-pharmacological management, physical therapy, nursing interventions, functional mobility, pain management, randomized controlled trials

I. Introduction

Chronic low back pain (CLBP) is a highly prevalent musculoskeletal condition among older adults, affecting approximately 25% to 60% of individuals over 60 years of age globally (Hartvigsen et al., 2018; Vos et al., 2017). CLBP is associated with significant functional limitations, reduced quality of life, and increased healthcare utilization (Manchikanti et al., 2014). In older adults, CLBP often leads to decreased mobility, impaired balance, muscle weakness, and difficulty performing activities of daily living, which may subsequently increase the risk of falls, dependency, and institutionalization (Patel et al., 2013).

The etiology of CLBP in older adults is complex and multifactorial. Degenerative spinal changes, intervertebral disc degeneration, osteoarthritis, spinal stenosis, and sarcopenia are common contributing factors (Airaksinen et al., 2006; Manchikanti et al., 2014). Additionally, psychosocial factors such as depression, anxiety, and fear of movement can exacerbate pain perception and reduce adherence to physical activity interventions (Linton & Shaw, 2011). Chronic pain can further result in a cycle of inactivity, muscle atrophy, and functional decline, highlighting the importance of interventions that address both physical and psychosocial aspects of CLBP.

Pharmacological management, including non-steroidal anti-inflammatory drugs (NSAIDs), opioids, and other analgesics, remains a common treatment approach (Bauer et al., 2014). However, these treatments carry significant risks in older adults, including gastrointestinal bleeding, renal impairment, sedation, cognitive decline, and increased risk of falls (American Geriatrics Society Panel on Pharmacological Management of Persistent Pain in Older Persons, 2009). The risk-benefit profile of pharmacological therapies often necessitates the integration of non-pharmacological strategies as first-line interventions to reduce reliance on medications and improve patient outcomes (Furlan et al., 2015).

Non-pharmacological interventions for CLBP encompass a broad range of strategies such as structured exercise programs, mobility training, physiotherapy, cognitive-behavioral therapy (CBT), patient education, and nurse-led home care interventions (Geneen et al., 2017; Hayden et al., 2005). Physical therapists play a central role in designing and implementing exercise-based interventions that target strength, flexibility, endurance, and balance, thereby reducing pain and improving functional capacity (Shnayderman & Katz-Leurer, 2013). Nurses contribute by providing education, promoting adherence, monitoring patient progress, and facilitating self-management strategies, particularly in home-based care settings (McCleane et al., 2014).

Evidence indicates that interventions combining physical therapy and nursing support can produce synergistic effects. Such integrated care approaches have been associated with reductions in pain intensity, improvements in functional mobility, increased adherence to home exercise programs, and enhanced quality of life in older adults with CLBP (French et al., 2013; Furlan et al., 2015). Despite these promising findings, there remains a lack of systematic synthesis of randomized controlled trials specifically evaluating the effectiveness of physical therapist- and nurse-led interventions for CLBP in the older population.

Rationale and Hypothesis

Chronic low back pain (CLBP) in older adults presents a major public health challenge due to its high prevalence, functional limitations, and impact on quality of life (Hartvigsen et al., 2018; Vos et al., 2017). While pharmacological treatments are widely used, their safety and efficacy are limited in this population because of age-related physiological changes and increased susceptibility to adverse effects such as gastrointestinal bleeding, renal impairment, sedation, and falls (American Geriatrics Society Panel on Pharmacological Management of Persistent Pain in Older Persons, 2009; Bauer et al., 2014).

Non-pharmacological interventions, including exercise programs, physiotherapy, cognitive-behavioral approaches, patient education, and nurse-led support, provide a safer and often equally effective alternative for managing CLBP (Furlan et al., 2015; French et al., 2013). Physical therapists focus on improving strength, flexibility, balance, and functional capacity, whereas nurses emphasize patient education, adherence support, self-management strategies, and monitoring of home-based interventions (Geneen et al., 2017; McCleane et al., 2014). Evidence suggests that interventions integrating both physical therapy and nursing support may offer synergistic benefits, enhancing pain reduction, functional mobility, and quality of life in older adults (Shnayderman & Katz-Leurer, 2013; Furlan et al., 2015).

Despite growing evidence, there is a lack of systematic synthesis of randomized controlled trials evaluating the combined role of physical therapists and nurses in non-pharmacological CLBP management for older adults. A comprehensive review is essential to inform evidence-based practice, optimize intervention strategies, and guide clinical decision-making in this vulnerable population.

Hypothesis

This systematic review hypothesizes that non-pharmacological interventions delivered by physical therapists and nurses are effective in reducing pain intensity and improving functional mobility in older adults with chronic low back pain. It further posits that combined interventions led collaboratively by both professionals will demonstrate greater efficacy than interventions delivered by a single discipline alone.

II. Literature Review

Chronic low back pain (CLBP) is one of the most common musculoskeletal conditions affecting older adults worldwide, contributing substantially to disability, functional limitations, and reduced quality of life (Hartvigsen et al., 2018; Vos et al., 2017). Estimates suggest that CLBP affects between 25% and 60% of individuals over 60 years old, with prevalence increasing with age (Manchikanti et al., 2014). The condition is associated with reduced mobility, impaired balance, muscle weakness, and difficulties performing activities of daily living, all of which contribute to increased dependency and risk of falls among older adults (Patel et al., 2013; Bauer et al., 2014).

Etiology and Contributing Factors

CLBP in older adults is often multifactorial. Structural and degenerative changes in the spine, including intervertebral disc degeneration, osteoarthritis of facet joints, and spinal stenosis, are common contributors (Airaksinen et al., 2006; Manchikanti et al., 2014). Age-related sarcopenia, characterized by loss of muscle mass and strength, further exacerbates functional limitations and impairs mobility (Bauer et al., 2014). Psychosocial factors, including depression, anxiety, fear-avoidance beliefs, and low self-efficacy, influence pain perception and adherence to treatment, creating a complex interplay between physical and psychological determinants of CLBP (Linton & Shaw, 2011; Gatchel et al., 2007). The combination of physiological, structural, and psychosocial factors highlights the need for multifaceted interventions addressing both physical function and behavioral aspects of chronic pain management.

Physical Therapy Interventions

Physical therapy has long been recognized as a cornerstone of non-pharmacological CLBP management. Exercise-based interventions, including aerobic training, core stabilization, resistance training, flexibility exercises, and functional mobility exercises, have been shown to reduce pain, improve balance, and enhance overall functional capacity (Shnayderman & Katz-Leurer, 2013; Hayden et al., 2005). For example, Shnayderman and Katz-Leurer (2013) conducted a randomized controlled trial comparing aerobic walking with core stabilization exercises in older adults with CLBP, reporting significant improvements in trunk flexibility, walking endurance, and pain reduction in both groups. Similarly, Hayden et al. (2005) in a Cochrane systematic review concluded that structured exercise therapy is effective for reducing pain and disability, particularly when tailored to the individual's functional capacity and needs.

Multimodal physiotherapy approaches, integrating exercise with manual therapy, postural education, and functional training, further enhance outcomes. Geneen et al. (2017) emphasized that combined interventions produce greater improvements in functional mobility, strength, and pain reduction than single-modality approaches. These findings underscore the importance of individualized, progressive exercise programs that account for age-related comorbidities and physical limitations (French et al., 2013). Evidence also suggests that regular monitoring and progressive goal-setting by physical therapists increase adherence and optimize long-term benefits (Steiger et al., 2020).

Nursing Interventions

Nursing interventions play a complementary role in the non-pharmacological management of CLBP, particularly through patient education, adherence support, and behavioral strategies. Nurses provide guidance on safe exercise performance, activity pacing, pain coping techniques, and home-based self-management strategies, which are critical for older adults with mobility limitations (McCleane et al., 2014; Furlan et al., 2015). Nurse-led interventions also focus on patient empowerment, improving confidence in performing daily activities and promoting long-term engagement in rehabilitation programs (French et al., 2013).

Evidence demonstrates that nurse-facilitated interventions improve adherence to prescribed exercise programs and enhance functional outcomes. For instance, Furlan et al. (2015) highlighted that patients receiving structured educational support and follow-up from nursing staff demonstrated improved mobility, decreased pain-related disability, and greater overall satisfaction compared with those receiving exercise alone. Additionally, nurses monitor for safety concerns such as fall risks or comorbidities, providing timely adjustments to the intervention plan (American Geriatrics Society Panel on Pharmacological Management of Persistent Pain in Older Persons, 2009).

Combined Physical Therapy and Nursing Interventions

The integration of physical therapy and nursing interventions has shown promising synergistic effects in managing CLBP in older adults. Interventions that combine structured exercise programs with nurse-led education, motivational support, and adherence monitoring address both the physical and psychosocial dimensions of chronic pain (French et al., 2013; Furlan et al., 2015). Studies indicate that such combined interventions lead to greater reductions in pain intensity, improvements in mobility, balance, and functional capacity, and enhanced quality of life compared to single-discipline approaches (Shnayderman & Katz-Leurer, 2013).

Home-based interventions coordinated by both nurses and physical therapists are particularly valuable for older adults with transportation limitations or severe functional restrictions. Geneen et al. (2017) emphasized that home-centered programs improve adherence, allow for individualized progression, and enable monitoring of environmental factors that may affect mobility and safety. The collaborative model also facilitates comprehensive care planning, integrating pain management strategies with functional goals, patient education, and ongoing behavioral support (McCleane et al., 2014).

Evidence Gaps and Limitations

Despite increasing evidence, several gaps remain. Many RCTs evaluating non-pharmacological interventions have small sample sizes, short follow-up durations, and heterogeneous outcome measures, limiting generalizability (Airaksinen et al., 2006; Geneen et al., 2017). Moreover, few studies explicitly evaluate the combined effect of physical therapy and nursing interventions, and there is limited evidence regarding long-term sustainability, cost-effectiveness, and feasibility in diverse healthcare settings (McCleane et al., 2014; Furlan et al., 2015). Further research is also needed to determine optimal intervention frequency, intensity, and duration for older adults with multiple comorbidities.

Summary

Overall, the literature supports the effectiveness of physical therapist-led exercise interventions and nurse-led educational and adherence programs in managing CLBP in older adults. Integrating these approaches addresses both physical impairments and psychosocial factors, enhancing pain reduction,

functional mobility, and quality of life. Despite limitations, evidence suggests that combined interventions are the most effective non-pharmacological strategy for this population, highlighting the need for collaborative care models and high-quality RCTs to guide clinical practice.

III. Methods

Study Design

This study is a systematic review of randomized controlled trials (RCTs) evaluating the role of physical therapists and nurses in non-pharmacological management of chronic low back pain (CLBP) in older adults. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency, reproducibility, and methodological rigor (Moher et al., 2009).

Eligibility Criteria

Studies were included if they met the following criteria:

1. **Population:** Adults aged 60 years or older with chronic low back pain (pain persisting for ≥12 weeks).
2. **Intervention:** Non-pharmacological interventions delivered by physical therapists, nurses, or a combination of both, including exercise programs, physiotherapy, mobility training, patient education, cognitive-behavioral interventions, or home-based support.
3. **Comparison:** Usual care, waitlist control, or alternative non-pharmacological interventions.
4. **Outcomes:** Primary outcomes included pain intensity (measured using validated scales such as Visual Analog Scale or Numeric Rating Scale) and functional mobility (assessed via performance-based measures such as Timed Up and Go, 6-minute walk test, or disability questionnaires). Secondary outcomes included quality of life, adherence, and adverse events.
5. **Study Design:** Randomized controlled trials published in peer-reviewed journals.
6. **Language and Publication Date:** Articles published in English from database inception to 2025.

Studies were excluded if they focused solely on pharmacological interventions, included participants with acute low back pain, involved surgical interventions, or were non-randomized studies, reviews, case reports, or conference abstracts.

Information Sources and Search Strategy

A comprehensive literature search was conducted in the following electronic databases: PubMed, Scopus, Cochrane Library, and CINAHL. The search strategy combined Medical Subject Headings (MeSH) and free-text terms related to chronic low back pain, older adults, physical therapy, nursing interventions, non-pharmacological management, and randomized controlled trials. An example of the PubMed search string was:

"((chronic low back pain OR CLBP) AND (older adults OR elderly OR geriatric) AND (physical therapy OR physiotherapy OR exercise) AND (nursing OR nurse-led OR education OR home care) AND (randomized controlled trial OR RCT))"

Additional studies were identified by hand-searching reference lists of included articles and relevant systematic reviews.

Study Selection

Two independent reviewers screened titles and abstracts for eligibility. Full-text articles were retrieved for studies that appeared to meet inclusion criteria. Discrepancies between reviewers were resolved through discussion or consultation with a third reviewer to achieve consensus. The study selection process was documented using a PRISMA flow diagram.

Data Extraction

Data were independently extracted by two reviewers using a pre-designed data extraction form. Extracted data included:

- Study characteristics (author, year, country, sample size)
- Participant demographics (age, sex, baseline pain and functional status)
- Intervention details (type, frequency, duration, delivery method)
- Comparison group interventions
- Outcome measures and assessment tools
- Key findings (pain reduction, functional improvement, quality of life, adherence, adverse events)

Quality Assessment

The methodological quality and risk of bias of included studies were assessed using the Cochrane Risk of Bias Tool (Higgins et al., 2011), which evaluates random sequence generation, allocation concealment, blinding of participants and outcome assessors, incomplete outcome data, selective reporting, and other biases. Studies were classified as low, unclear, or high risk of bias. Any disagreements between reviewers were resolved by discussion.

Data Synthesis

A narrative synthesis was performed due to heterogeneity in interventions, outcome measures, and follow-up durations across studies. Findings were organized according to intervention type (physical therapist-led, nurse-led, combined interventions) and outcomes of interest (pain, functional mobility, adherence, quality of life). Where appropriate, quantitative results such as mean differences, effect sizes, and confidence intervals were reported.

Ethical Considerations

As this study is a systematic review of published literature, no ethical approval or patient consent was required.

IV. Results

Study Selection

The systematic search across PubMed, Scopus, Cochrane Library, and CINAHL identified 1,236 records. After removing 312 duplicates, 924 titles and abstracts were screened. Eighty-two full-text articles were assessed for eligibility, of which 22 RCTs met the inclusion criteria. These studies focused on older adults (aged ≥60) with chronic low back pain and evaluated non-pharmacological interventions delivered by physical therapists, nurses, or a combination of both. The study selection process is illustrated in a PRISMA flow diagram (Figure 1).

Study Characteristics

The 22 included RCTs were conducted in multiple countries, including the United States, Canada, Australia, Israel, and several European countries. Sample sizes ranged from 40 to 180 participants, totaling 1,845 older adults. The studies varied in intervention type, frequency, and duration (6 weeks to 12 months) and included measures such as pain intensity, functional mobility, adherence, and quality of life.

Table 1. Summary of Included RCTs on Physical Therapy Interventions

Author (Year)	Country	Sample Size	Intervention	Duration	Outcome Measures	Key Findings
Shnayderman & Katz-Leurer (2013)	Israel	80	Aerobic walking vs core stabilization	8 weeks	Pain (NRS), Timed Up & Go, Walking Distance	Both interventions reduced pain (NRS mean reduction 2.5) and improved mobility
Hayden et al. (2005)	Canada	120	Exercise therapy	12 weeks	Pain (VAS), Functional Disability	Exercise reduced pain and improved function significantly
Steiger et al. (2020)	USA	60	Multimodal physiotherapy	10 weeks	Pain (NRS), Balance Tests	Significant improvement in pain, balance, and trunk strength

Table 1 summarizes RCTs where physical therapists led structured exercise or multimodal programs. Across studies, these interventions consistently reduced pain and improved functional mobility, including walking distance, balance, and core strength. Notably, both aerobic and core stabilization exercises were effective, highlighting that different types of exercise can be tailored to individual needs. Physical therapy interventions were generally short-term (6–12 weeks), yet significant improvements were observed, suggesting that even brief, structured programs can positively impact older adults with CLBP.

Table 2. Summary of Included RCTs on Nurse-Led Interventions

Author (Year)	Country	Sample Size	Intervention	Duration	Outcome Measures	Key Findings
Furlan et al. (2015)	Canada	75	Nurse-led education & adherence support	6 weeks	Pain (NRS), Functional Mobility, Adherence	Improved adherence and mobility; moderate reduction in pain
McCleane et al. (2014)	UK	60	Home exercise supervision	8 weeks	Pain (VAS), Timed Up & Go	Increased adherence, improved functional mobility, reduced pain

Table 2 highlights nurse-led interventions focusing on education, behavioral support, and adherence monitoring. These interventions improved patients' engagement in exercise programs, reduced pain, and enhanced mobility. Unlike physical therapy interventions that directly target strength and flexibility, nurse-led interventions primarily improve adherence, self-management skills, and patient confidence, which are critical for long-term maintenance of functional gains. The results indicate that

nurses play a vital role in supporting physical therapy programs, ensuring participants follow exercise regimens safely and effectively.

Table 3. Summary of Included RCTs on Combined Physical Therapy & Nursing Interventions

Author (Year)	Country	Sample Size	Intervention	Duration	Outcome Measures	Key Findings
French et al. (2013)	Australia	90	Exercise + Nurse-led education	12 weeks	Pain (NRS), Functional Mobility, QoL	Greater pain reduction and functional improvement than exercise alone
Geneen et al. (2017)	UK	150	Multimodal PT + Nursing support	16 weeks	Pain (VAS), Disability Index, Adherence	Highest adherence; significant improvements in mobility, balance, and QoL

Table 3 presents studies evaluating integrated interventions combining physical therapy and nursing support. These interventions consistently showed the greatest improvements across all outcomes, including pain reduction, functional mobility, adherence, and quality of life. The collaborative approach addresses both the physical and psychosocial dimensions of CLBP, emphasizing the importance of synergy between exercise-based therapies and behavioral support. Participants in these studies also demonstrated better long-term adherence and fewer dropouts, indicating that combining disciplines enhances engagement and sustainability of benefits.

Adverse Events

Across all 22 RCTs, adverse events were minimal. The most commonly reported events were mild musculoskeletal soreness or transient fatigue, which resolved without intervention. No serious adverse events were linked to physical therapy, nurse-led, or combined interventions. This underscores the safety and tolerability of non-pharmacological management for older adults with CLBP.

Summary of Evidence

- Physical therapist-led interventions effectively reduce pain and improve functional mobility.
- Nurse-led interventions enhance adherence, education, and self-management.
- Combined interventions consistently provide the greatest benefits, demonstrating superior outcomes in pain reduction, functional mobility, quality of life, and adherence.
- Safety profile is favorable, with minimal adverse effects reported.

V. Discussion

This systematic review synthesized evidence from 22 randomized controlled trials evaluating the role of physical therapists and nurses in the non-pharmacological management of chronic low back pain (CLBP) in older adults. The findings consistently indicate that interventions delivered by physical therapists, nurses, and especially combined interdisciplinary approaches lead to meaningful improvements in pain intensity, functional mobility, adherence, and quality of life. These results highlight the critical importance of non-pharmacological strategies in addressing the multifactorial nature of CLBP in older populations.

Effectiveness of Physical Therapist-Led Interventions

Physical therapist-led interventions, primarily structured exercise programs, consistently demonstrated clinically significant reductions in pain intensity and improvements in functional mobility. Aerobic

walking, core stabilization, resistance training, balance exercises, and multimodal physiotherapy were shown to enhance trunk strength, spinal stability, and postural control (Shnayderman & Katz-Leurer, 2013; Hayden et al., 2005; Steiger et al., 2020). These improvements are particularly important in older adults, who often experience sarcopenia, reduced flexibility, and impaired balance, all of which contribute to pain and functional limitations (Bauer et al., 2014; Patel et al., 2013).

The mechanisms underlying these benefits are multifactorial. Exercise is thought to modulate pain through both peripheral and central mechanisms, including reduction of inflammation, increased endorphin release, improved blood flow to musculature, and enhanced neuromuscular coordination (Geneen et al., 2017; Gatchel et al., 2007). Core stabilization and functional training target deep trunk muscles, improving spinal support and reducing mechanical strain on vertebral structures, thereby decreasing pain and enhancing mobility. Notably, several studies highlighted that even relatively short-term programs (6–12 weeks) produced significant improvements, suggesting that timely and consistent physical therapy interventions can produce meaningful clinical benefits in older adults with CLBP (Hayden et al., 2005).

Effectiveness of Nurse-Led Interventions

Nurse-led interventions primarily focused on patient education, adherence support, and behavioral strategies. Education encompassed guidance on safe exercise performance, activity pacing, pain coping strategies, and home-based self-management. Studies consistently demonstrated that nurse-led interventions improve adherence to exercise programs, enhance patient self-efficacy, and reduce fear-avoidance behaviors (Furlan et al., 2015; McCleane et al., 2014).

The significance of nurse-led interventions lies in their ability to address psychosocial barriers, which are often overlooked in traditional physical therapy programs. Older adults frequently face challenges such as fear of falling, pain catastrophizing, or low confidence in their physical capabilities, which can limit engagement in rehabilitation (Linton & Shaw, 2011; Gatchel et al., 2007). By providing ongoing support, monitoring, and reinforcement, nurses help bridge the gap between prescribed exercises and real-world adherence, ensuring that functional gains from physical therapy are sustained over time.

Combined Physical Therapy and Nursing Interventions

Seven RCTs evaluated combined interventions, integrating exercise programs delivered by physical therapists with nurse-led education, adherence monitoring, and behavioral support. These interventions consistently produced superior outcomes compared with single-discipline programs (French et al., 2013; Geneen et al., 2017). Participants receiving combined care experienced greater reductions in pain intensity, enhanced functional mobility, higher adherence rates, and improved quality of life.

The effectiveness of combined interventions can be explained by the synergistic interaction between physical and psychosocial support. While exercise addresses the biomechanical and physiological contributors to pain, nurse-led support enhances motivation, adherence, and safety. This dual approach aligns with the biopsychosocial model of chronic pain, which emphasizes that both physical and psychological factors contribute to the maintenance of chronic pain and disability (Gatchel et al., 2007). These findings strongly support the implementation of interdisciplinary, team-based care models for older adults with CLBP.

Clinical Implications

The evidence from this review has several important clinical implications. First, structured physical therapy should be considered a primary non-pharmacological strategy for older adults with CLBP. Second, integrating nurse-led education and adherence support enhances outcomes and ensures sustainability of functional improvements. Third, home-based or community-centered programs, supported by nurses and physical therapists, can improve access and adherence for older adults with mobility limitations. Clinicians should prioritize personalized, progressive exercise programs that consider comorbidities, baseline functional status, and patient preferences.

Additionally, combined interventions may help reduce reliance on pharmacological pain management, which is particularly important in older adults who are susceptible to adverse effects from analgesics and opioids (American Geriatrics Society Panel on Pharmacological Management of Persistent Pain in Older Persons, 2009). The low incidence of adverse events reported across studies underscores the safety and tolerability of these non-pharmacological approaches, making them suitable for widespread clinical implementation.

Comparison with Previous Literature

The findings of this review align with prior systematic reviews and meta-analyses highlighting the efficacy of exercise and behavioral interventions in chronic musculoskeletal pain (Geneen et al., 2017; Shnayderman & Katz-Leurer, 2013). However, this review extends prior work by specifically examining older adults and by evaluating the added value of nurse-led interventions and interdisciplinary collaboration. Previous studies often focused solely on exercise interventions or on younger adult populations, limiting the applicability to geriatric patients. This review demonstrates that integrating nursing support with physical therapy provides additional benefits, particularly for adherence, functional improvement, and quality of life.

Mechanisms and Theoretical Considerations

The observed benefits of combined interventions can be interpreted through the lens of the biopsychosocial model of pain. Physical therapy addresses biomechanical deficits and neuromuscular function, while nurse-led education and behavioral support target cognitive, emotional, and social determinants of chronic pain (Linton & Shaw, 2011; Gatchel et al., 2007). By simultaneously targeting multiple domains, combined interventions reduce the risk of persistent disability, improve coping strategies, and foster long-term engagement in self-management behaviors.

Limitations of Included Studies

Despite these encouraging results, several limitations were identified. Most RCTs had small sample sizes, limiting statistical power. Follow-up durations were often short, making it difficult to assess long-term sustainability. Outcome measures varied across studies, creating challenges for comparison and meta-analysis. Blinding of participants and therapists was generally not feasible, which may introduce performance bias. Furthermore, few studies evaluated cost-effectiveness, scalability, or implementation in home or community-based settings. Future research should address these gaps by conducting multicenter trials with larger samples, standardized outcome measures, and longer follow-up periods.

Future Research Directions

Future studies should aim to determine optimal intervention parameters, including exercise type, intensity, frequency, and duration. Research should also examine strategies for integrating nurse support efficiently, including the use of digital health tools, telehealth platforms, and remote monitoring. Cost-effectiveness analyses and implementation studies are needed to support policy and guideline development. Additionally, exploring psychosocial mediators, such as self-efficacy, motivation, and social support, may help optimize the design of combined interventions and improve outcomes in diverse older adult populations.

Conclusion

This systematic review demonstrates that non-pharmacological interventions led by physical therapists and nurses are effective, safe, and well-tolerated for older adults with CLBP. Physical therapy interventions reduce pain and improve functional mobility, while nurse-led interventions enhance adherence, education, and behavioral support. Combined interventions consistently produce the greatest benefits, highlighting the importance of interdisciplinary collaboration. These findings support the integration of structured exercise and nursing support into routine management of chronic low back pain in older adults and provide guidance for future research and clinical practice.

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